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Sealing ring and sealing ring arrangement

Claims

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1. . Sealing ring for sealing two components moving relative to each other, particularly as a rotary shaft seal or piston ring, with a radially internal or external sealing surface that can be brought into contact with one of the components to form a seal against a fluid medium, where, to the side of the sealing surface, the sealing ring displays a pressurizing surface to be pressurized by the fluid medium and, on the opposite side, a supporting surface to the side of the sealing surface for positioning against a groove flank of a component accommodating the sealing ring, c h a r a c t e r i z e d i n t h a t the pressurizing surface or the supporting surface, or the pressurizing surface and the supporting surface, are inclined relative to the sealing surface and enclose an angle of less than 90° towards it, and in that the sealing ring is capable of radial compression towards a radially internal sealing surface, or of expansion towards a radially external sealing surface.

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2. Sealing ring according to Claim 1, c h a r a c t e r - i z e d i n t h a t the pressurizing surface or the supporting surface, or the pressurizing surface and the supporting surface, each form a lateral surface of a truncated cone.

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3. Sealing ring according to Claim 2, c h a r a c t e r -
i z e d i n t h a t the areas of the lateral surface of
a truncated cone of the pressurizing surface or the sup-
5 porting surface, or of the pressurizing surface and the
supporting surface, each enclose an angle of 30° to 60°
with the sealing surface towards said sealing surface.
4. Sealing ring according to Claim 2, c h a r a c t e r -
10 i z e d i n t h a t the area of the pressurizing sur-
face or the supporting surface, or of the pressurizing
surface and the supporting surface, with the form of a
truncated cone follows on laterally, at least almost di-
rectly, from the sealing surface.
- 15 5. Sealing ring according to Claim 1, c h a r a c t e r -
i z e d i n t h a t a surface is located between the
pressurizing surface and the supporting surface, opposite
to the sealing surface, which is a lateral surface of a
20 truncated cone, or a surface of a cylinder, or a concavely
arched surface forming a transitional area.
6. Sealing ring according to Claim 1, c h a r a c t e r -
i z e d i n t h a t the radial thickness of the sealing
25 ring is less than/equal to the extension of the sealing
surface in the axial direction of the sealing ring.
7. Sealing ring according to Claim 1, c h a r a c t e r -
i z e d i n t h a t the pressurizing surface or the
30 supporting surface, or the pressurizing surface and the
supporting surface, is or are profiled.
8. Sealing ring according to Claim 1, c h a r a c t e r -
i z e d i n t h a t the sealing ring is divided almost
35 completely or throughout in the radial direction at one
point on its circumference, forming a weaker area.

9. Sealing ring according to Claim 8, c h a r a c t e r -
i z e d i n t h a t the weaker area is designed as a
complete division of the sealing ring, forming two oppo-
5 site sealing ring ends, in that at least one, integrally
molded area extending in the circumferential direction of
the sealing ring is provided on each of the sealing ring
ends, and in that the areas associated with different
sealing ring ends are located one behind the other in the
10 axial direction of the sealing ring, forming a labyrinth
seal, and are in contact with each other, at least in op-
erating condition of the sealing ring.
10. Sealing ring according to Claim 1, c h a r a c t e r -
15 i z e d i n t h a t the sealing ring consists of a
plastic with an elongation at break at room temperature of
 $\leq 50\%$.
11. Sealing ring according to Claim 1, c h a r a c t e r -
20 i z e d i n t h a t the sealing surface is designed as
the surface of a cylinder.
12. Sealing ring according to Claim 1, c h a r a c t e r -
i z e d i n t h a t the sealing ring is accommodated in
25 a component in a groove without undercut, in that the
groove displays a supporting flank opposite the supporting
surface of the sealing ring and a pressure-side flank op-
posite the pressurizing surface of the sealing ring, in
that the sealing surface of the sealing ring projects from
30 the receiving component in the radial direction, in that
the pressure-side flank or the supporting flank, or the
pressure-side flank and the supporting flank, of the
groove is or are inclined relative to the sealing surface
of the sealing ring, each enclosing an angle of less than
35 90° towards it, and in that a gap is provided, at least
between the pressurizing surface of the sealing ring and

the pressure-side flank, into which a fluid medium to be provided on the pressure side of the sealing ring can flow, pressing the sealing ring in sealing fashion against the supporting flank of the groove and against a component to be sealed that corresponds to the first component, and, by application of pressure by the fluid medium, the supporting surface of the sealing ring can be brought into flat contact with the supporting flank of the groove, at least on the side facing the sealing surface.

13. Sealing arrangement with a sealing ring according to one of Claims 1 to 11, and with a component which displays a groove without undercut to accommodate the sealing ring, where the groove displays a supporting flank opposite the supporting surface of the sealing ring, and a pressure-side flank opposite the pressurizing surface of the sealing ring, where the sealing surface of the sealing ring projects from the receiving component in the radial direction, characterized in that the pressure-side flank or the supporting flank, or the pressure-side flank and the supporting flank, of the groove is or are inclined relative to the sealing surface of the sealing ring, each enclosing an angle of less than 90° towards it, and in that a gap is provided, at least between the pressurizing surface of the sealing ring and the pressure-side flank, into which a fluid medium to be provided on the pressure side of the sealing ring can flow, pressing the sealing ring in sealing fashion against the supporting flank of the groove and against a component to be sealed that corresponds to the first component, and, by application of pressure by the fluid medium, the supporting surface of the sealing ring can be brought into flat contact with the supporting flank of the groove, at least on the side facing the sealing surface, where at least the area of the sealing surface facing the supporting surface is arranged at least essentially parallel, or exactly paral-

lel, to the longitudinal axis of the sealing ring.

14. Sealing arrangement according to Claim 13, c h a r a c -
t e r i z e d i n t h a t the gap extends at least par-
5 tially over the side of the sealing ring opposite the
sealing surface of the sealing ring, which forms a transi-
tional area between the supporting surface and the pres-
surizing surface (8).
- 10 15. Sealing arrangement according to Claim 13, c h a r a c -
t e r i z e d i n t h a t the sealing ring projects
from the groove (5) in the component in the radial direc-
tion by less than one-third of its radial thickness.
- 15 16. Sealing arrangement according to Claim 13, c h a r a c -
t e r i z e d i n t h a t the supporting flank of the
groove can be brought into full contact with the support-
ing surface of the sealing ring by pressurizing the fluid
medium.
- 20 17. Sealing arrangement according to Claim 13, c h a r a c -
t e r i z e d i n t h a t the gap displays an essen-
tially constant gap width over its radial extension.
- 25 18. Sealing arrangement according to Claim 13, c h a r a c -
t e r i z e d i n t h a t the groove is of rounded de-
sign in the area of the groove base, or in at least one
transitional area to an adjacent groove flank.
- 30 19. Sealing arrangement according to Claim 13, c h a r a c -
t e r i z e d i n t h a t a first component is pro-
vided, which displays the sealing ring accommodated in a
circumferential groove, and in that a second component is
provided, which is capable of motion relative to the first
35 component and with which the sealing surface of the seal-
ing ring can be brought into contact in sealing fashion

during motion of the components relative to each other, and in that the sealing ring is located in the groove without pretension in relation to the component to be sealed.

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20. Sealing arrangement according to Claim 13, c h a r a c -
t e r i z e d i n t h a t the component accommodating
the sealing ring in a groove is a shaft, and in that a
shaft guide is provided, with which the sealing surface of
10 the sealing ring can be brought into contact in sealing
fashion by application of the pressure of the fluid medium
during rotary motion of the shaft and the shaft guide
relative to each other, in that the shaft guide is made of
a light metal, and in that the supporting surface of the
15 sealing ring is inclined to the longitudinal axis of the
sealing ring such that, owing to the pressure force of the
fluid medium on the sealing ring, the sealing ring is lo-
cated in non-rotating fashion relative to the shaft guide.
- 20 21. Sealing arrangement according to Claim 13, c h a r a c -
t e r i z e d i n t h a t the component accommodating
the sealing ring is a shaft guide, and in that a shaft ca-
pable of rotation relative to it is provided, with which
the sealing surface of the sealing ring can be brought
25 into contact in sealing fashion.
22. Sealing arrangement according to Claim 13, c h a r a c -
t e r i z e d i n t h a t the shaft and the shaft guide
are components of an automatic transmission, and in that
30 the sealing ring is provided for sealing at least one oil
passage.
23. Sealing arrangement according to Claim 13, c h a r a c -
t e r i z e d i n t h a t the sealing ring is located
35 in a groove of a piston of a piston engine, and in that
the sealing ring provides a seal against a cylinder guid-

ing the piston.

24. Sealing arrangement according to Claim 23, c h a r a c -
t e r i z e d i n t h a t the piston is a piston of a
5 combustion engine, or of a steam engine, or of a recipro-
cating pump.